APPENDIX D-5. DESIGN OPTION COMBINATIONS

TABLES

APPENDIX D-5. DESIGN OPTION COMBINATIONS

This Appendix contains a list of all design option combinations for residential electric and gas-fired water heaters explored in order to develop the final set of designs used in the analysis to develop federal efficiency standards for such products.

A total of 23 alternative combinations were explored to develop a set of 6 electric water heater design option combinations. Table D-5.1 provides a list of all of the alternative combinations explored for electric water heaters.

A total of 87 alternative combinations were explored to develop a set of 8 gas water heater design options. Table D-5.2 provides a list of all of the alternative combinations explored for gas-fired water heaters.

Table D-5.1 Complete List of Alternative Design Option Combinations - Electric Water Heaters

Design Index	Design Option
00	Existing Baseline
1	2003 Baseline
2	Heat Trap
3	Increased Insulation (2" foam)
3a	Increased Insulation (2" foam) + Heat Trap
4	Increased Insulation (2.5" foam)
4a	Increased Insulation (2.5" foam) + Heat Trap
5	Increased Insulation (3" foam)
5a	Increased Insulation (3" foam) + Heat Trap
6	Insulted Tank Bottom
6a	Insulated Bottom + Heat Trap
7	Insulated Bottom + Increased Insulation (2" foam)
7a	Insulated Bottom + Increased Insulation (2" foam) + Heat Trap
8	Insulated Bottom + Increased Insulation (2.5" foam)
8a	Insulated Bottom + Increased Insulation (2.5" foam) + Heat Trap
9	Insulated Bottom + Increased Insulation (3" foam)
9a	Insulated Bottom + Increased Insulation (3" foam) + Heat Trap
10	Plastic Tank
10a	Plastic Tank + Heat Trap
11	Plastic Tank + Increased Insulation (2" foam)
11a	Plastic Tank + Increased Insulation (2" foam) + Heat Trap
12	Plastic Tank + Increased Insulation (2.5" foam)
12a	Plastic Tank + Increased Insulation (2.5" foam) + Heat Trap
13	Plastic Tank + Increased Insulation (3" foam)
13a	Plastic Tank + Increased Insulation (3" foam) + Heat Trap

Table D-5.2 Complete List of Alternative Design Option Combinations - Gas Water Heaters

Design Index	Design Option
0	Existing Baseline
1	2003 Baseline
1a	2003 Baseline 245fa (Resistance to Flammable Vapors Ignition)
2	Heat Trap
3	Increased Insulation (2" foam)
3a	Increased Insulation (2" foam) + Heat Trap
4	Increased Insulation (2.5" foam)
4a	Increased Insulation (2.5" foam) + Heat Trap
5	Increased Insulation (3" foam)
5a	Increased Insulation (3" foam) + Heat Trap
6	78% RE (Improved Flue Baffle)
6a	78% RE (Improved Flue Baffle) + Heat Trap
7	78% RE (Improved Flue Baffle) + Increased Insulation (2" foam)
7a	78% RE (Improved Flue Baffle) + Increased Insulation (2" foam) + Heat Trap
8	78% RE (Improved Flue Baffle) + Increased Insulation (2.5" foam)
8a	78% RE (Improved Flue Baffle) + Increased Insulation (2.5" foam) + Heat Trap
9	78% RE (Improved Flue Baffle) + Increased Insulation (3" foam)
9a	78% RE (Improved Flue Baffle) + Increased Insulation (3" foam) + Heat Trap
10	80% RE (Improved Flue Baffle)
10a	80% RE (Improved Flue Baffle) + Heat Trap
11	80% RE (Improved Flue Baffle) + Increased Insulation (2" foam)
11a	80% RE (Improved Flue Baffle) + Increased Insulation (2" foam) + Heat Trap
12	80% RE (Improved Flue Baffle) + Increased Insulation (2.5" foam)
12a	80% RE (Improved Flue Baffle) + Increased Insulation (2.5" foam) + Heat Trap
13	80% RE (Improved Flue Baffle) + Increased Insulation (3" foam)
13a	80% RE (Improved Flue Baffle) + Increased Insulation (3" foam) + Heat Trap
14	Electronic Ignition & Electromech. Flue Damper
14a	Electronic Ignition & Electromech. Flue Damper + Heat Trap
14b	Electronic Ignition & Electromech. Flue Damper + Heat Trap + 78% RE
14c	Electronic Ignition & Electromech. Flue Damper + Heat Trap + 80% RE
15	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2" foam)
15a	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2" foam) + Heat Trap
15b	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2" foam) + Heat Trap + 78% RE
15c	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2" foam) + Heat Trap + 80% RE
16	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2.5" foam)
16a	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2.5" foam) + Heat Trap
16b	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2.5" foam) + Heat Trap + 78% RE
16c	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (2.5" foam) + Heat Trap + 80% RE

Table D-5.2 Complete List of Alternative Design Option Combinations - Gas Water Heaters (cont'd)

Design Index	Design Option
17	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (3" foam)
17a	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (3" foam) + Heat Trap
17b	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (3" foam) + Heat Trap + 78% RE
17c	Electronic Ignition & Electromech. Flue Damper + Increased Insulation (3" foam) + Heat Trap + 80% RE
18	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE)
18a	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE + Heat Trap)
18c	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE+ Insulation 2")
18d	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE+ Insulation 2" + Heat Trap)
18e	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE+ Insulation 2.5")
18f	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE+ Insulation 2.5" + Heat Trap)
18g	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE+ Insulation 3")
18h	Side-Arm Design (Indirect Heating + IID + Metal Tank + 76% RE+ Insulation 3" + Heat Trap)
19	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE)
19a	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE + Heat Trap)
19c	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE+ Insulation 2")
19d	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE+ Insulation 2" + Heat Trap)
19e	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE+ Insulation 2.5")
19f	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE+ Insulation 2.5" + Heat Trap)
19g	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE+ Insulation 3")
19h	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 76% RE+ Insulation 3" + Heat Trap)
20	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE)
20a	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE + Heat Trap)
20c	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE+ Insulation 2")
20d	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE+ Insulation 2" + Heat Trap)
20e	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE+ Insulation 2.5")
20f	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE+ Insulation 2.5" + Heat Trap)
20g	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE+ Insulation 3")
20h	Side-Arm Design (Indirect Heating + IID + Metal Tank + 78% RE+ Insulation 3" + Heat Trap)

Table D-5.2 Complete List of Alternative Design Option Combinations - Gas Water Heaters (cont'd)

Design Index	Design Option
21	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE)
21a	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE + Heat Trap)
21c	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE+ Insulation 2")
21d	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE+ Insulation 2" + Heat Trap)
21e	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE+ Insulation 2.5")
21f	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE+ Insulation 2.5" + Heat Trap)
21g	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE+ Insulation 3")
21h	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 78% RE+ Insulation 3" + Heat Trap)
22	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE)
22a	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE + Heat Trap)
22c	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE+ Insulation 2")
22d	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE+ Insulation 2" + Heat Trap)
22e	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE+ Insulation 2.5")
22f	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE+ Insulation 2.5" + Heat Trap)
22g	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE+ Insulation 3")
22h	Side-Arm Design (Indirect Heating + IID + Metal Tank + 80% RE+ Insulation 3" + Heat Trap)
23	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE)
23a	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE + Heat Trap)
23c	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE+ Insulation 2")
23d	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE+ Insulation 2" + Heat Trap)
23e	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE+ Insulation 2.5")
23f	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE+ Insulation 2.5" + Heat Trap)
23g	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE+ Insulation 3")
23h	Side-Arm Design (Indirect Heating + IID + Plastic Tank + 80% RE+ Insulation 3" + Heat Trap)